

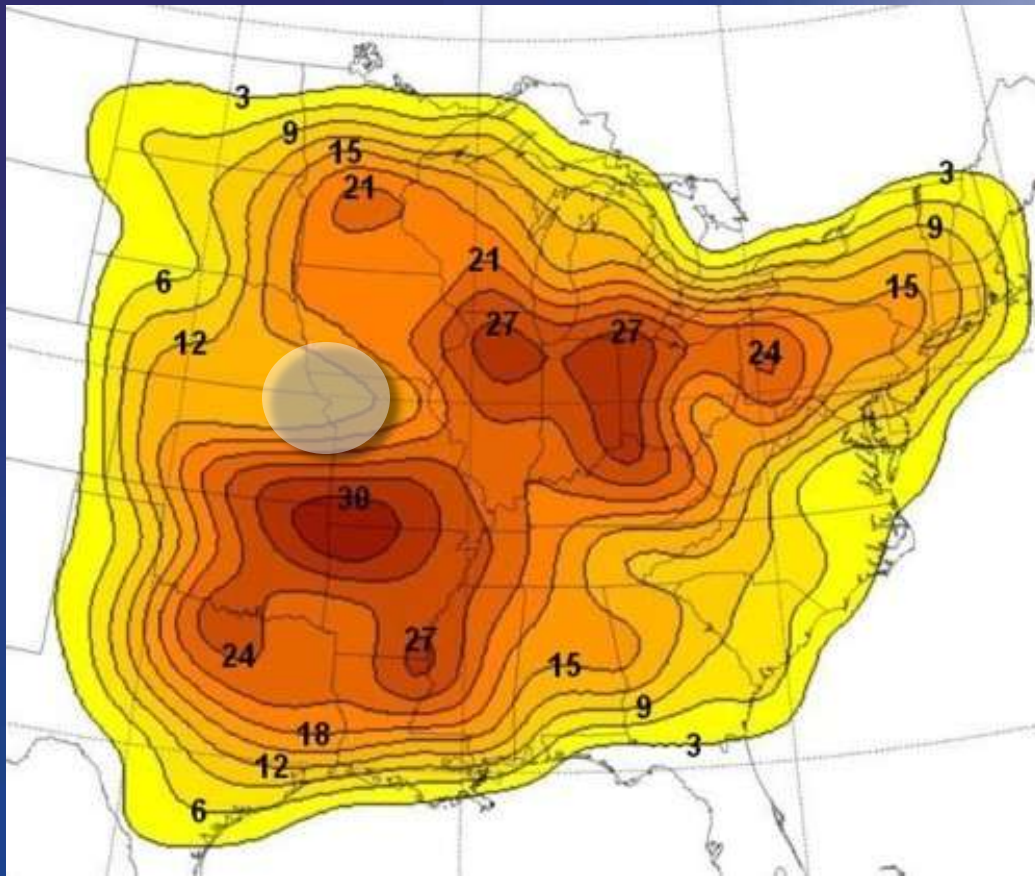


A Multiple Doppler Perspective of the 02 May 2008 Kansas City Bow Echo

***Evan Bookbinder, Suzanne Fortin, Mark
O'Malley, Derek Deroche***

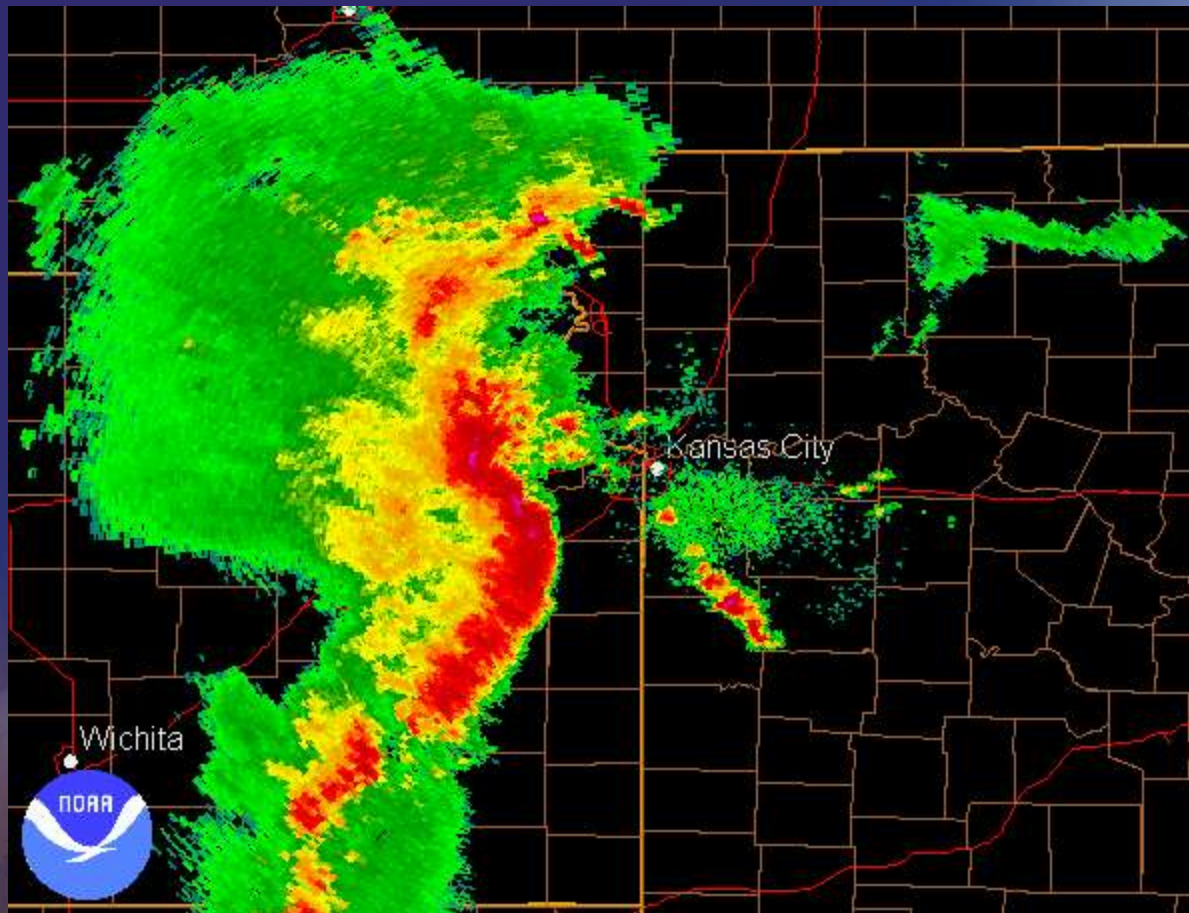
***National Weather Service
Kansas City/Pleasant Hill, Missouri***

Derecho Frequency 1980-2001



From Coniglio and Stensrud (2004)

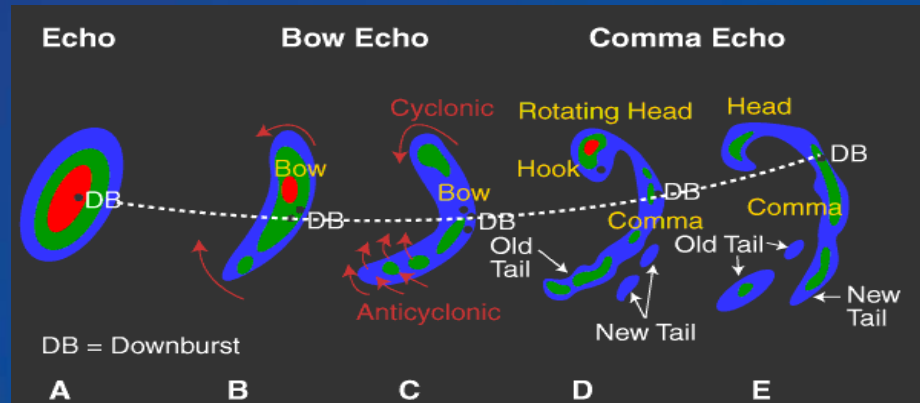
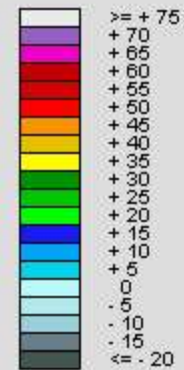
- Preference across the Corn Belt into the Ohio Valley (warm season) and the eastern portion of the southern Plains into the lower Mississippi Valley (cool season)



NEXRAD LEVEL-II
KEAX - KANSAS CITY, MO
05/02/2008 06:18:45 GMT
LAT: 38/48/36 N
LON: 94/15/50 W
ELEV: 995.0 FT
VCP: 212

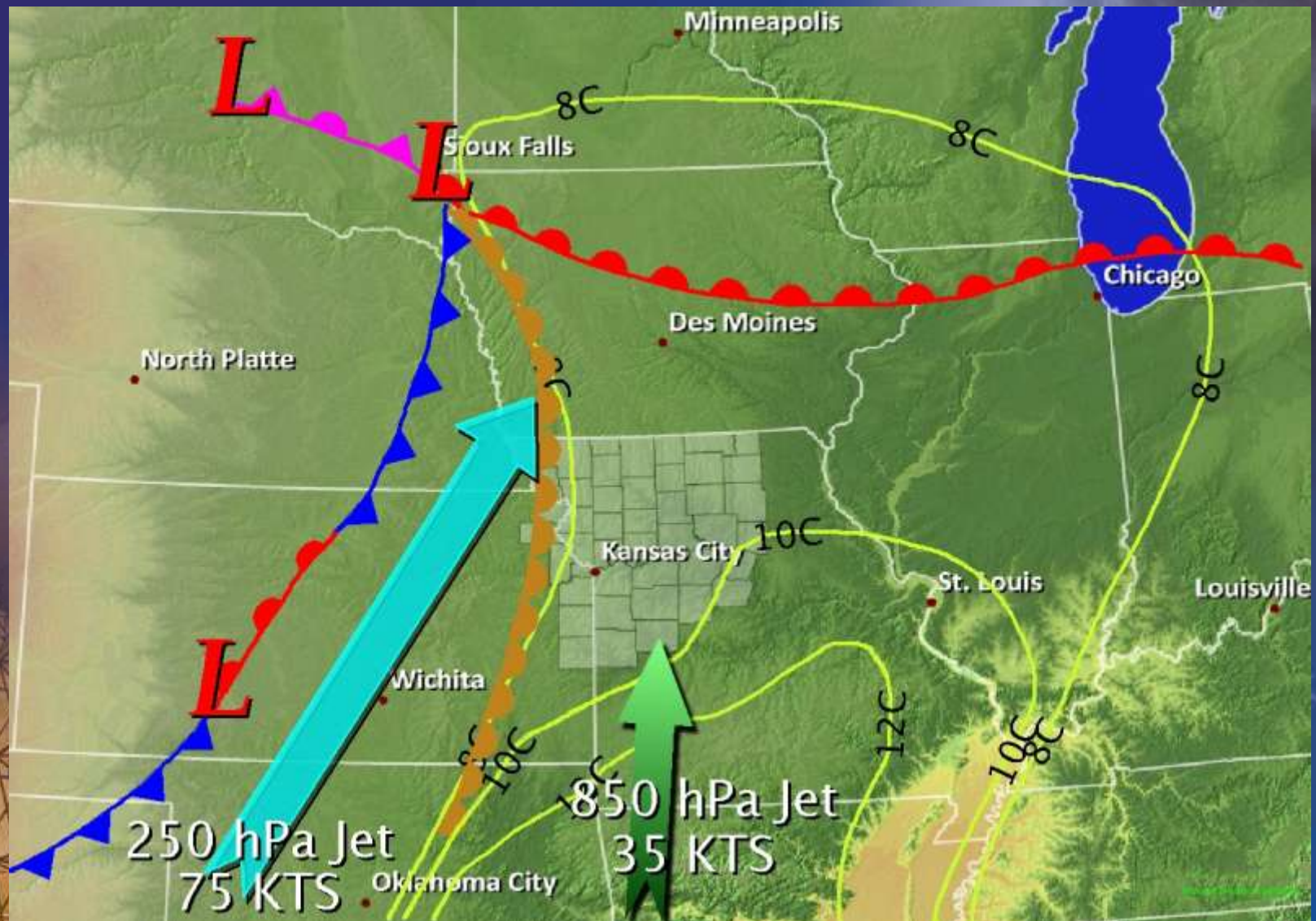
REFLECTIVITY
ELEV ANGLE: 0.53
SCAN TIME: 06:18:44

Legend: (Category) dBZ

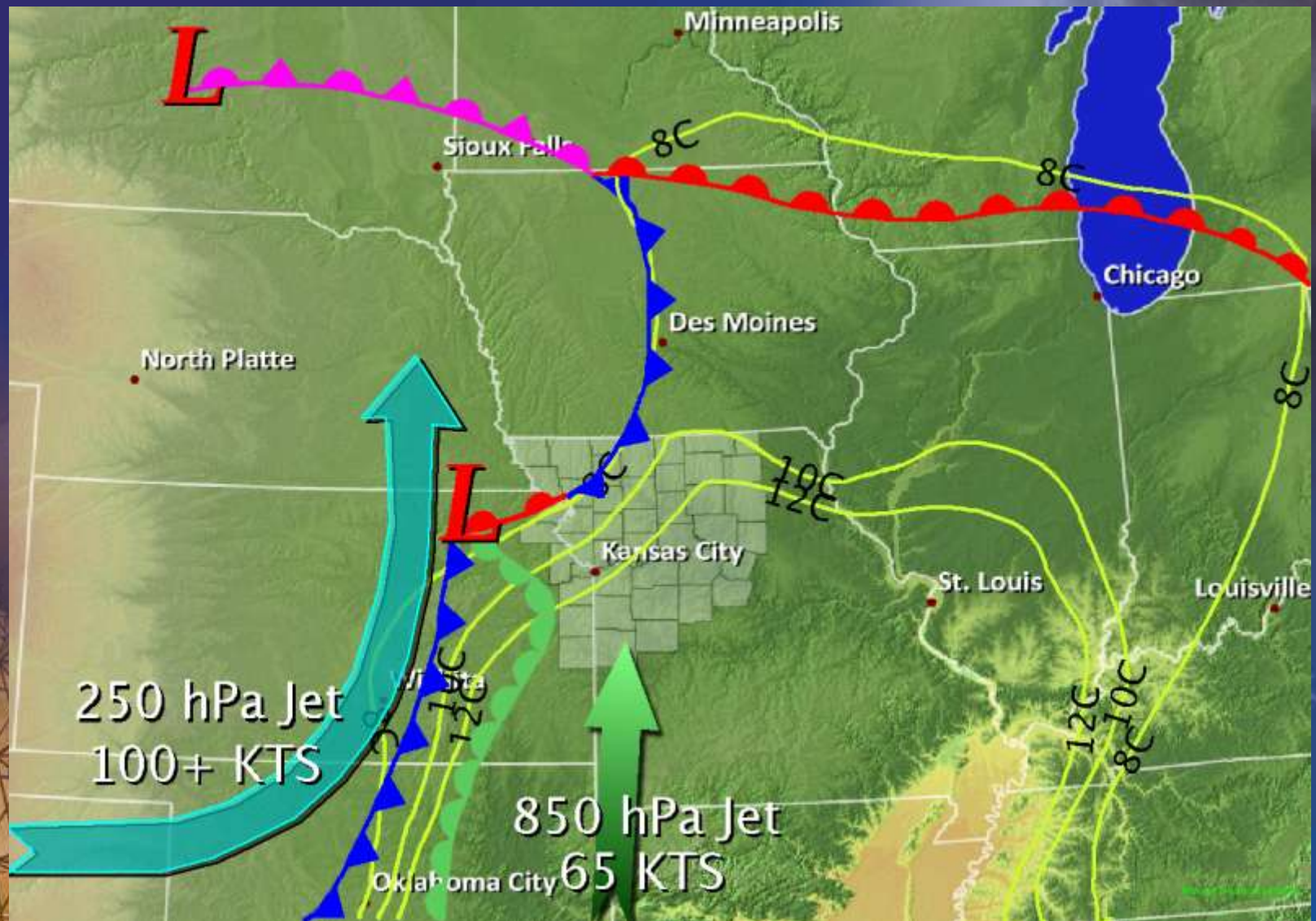


(From Fujita 1978)

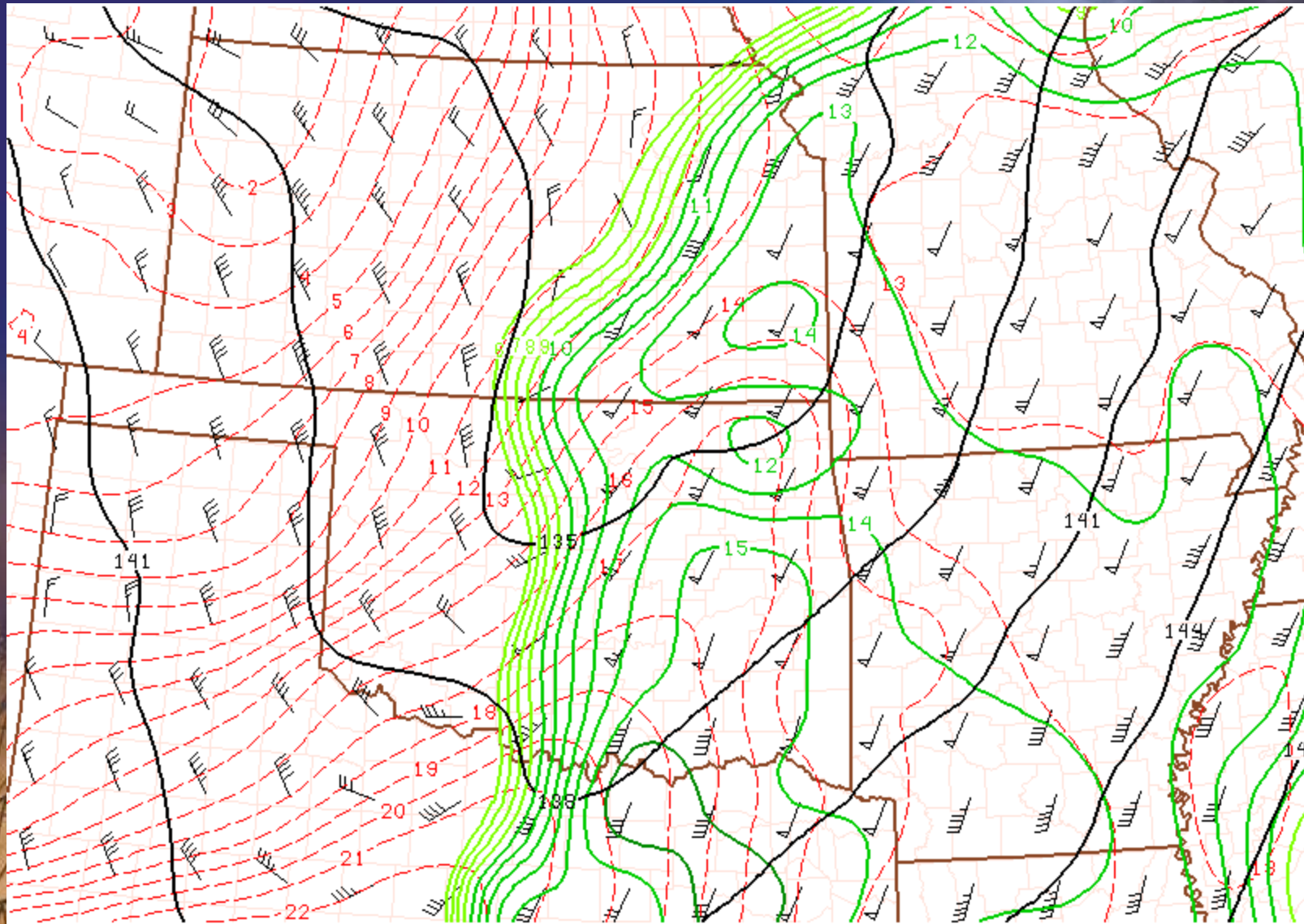
02 May 2008 – 00Z Composite Chart



02 May 2008 – 06Z Composite Chart

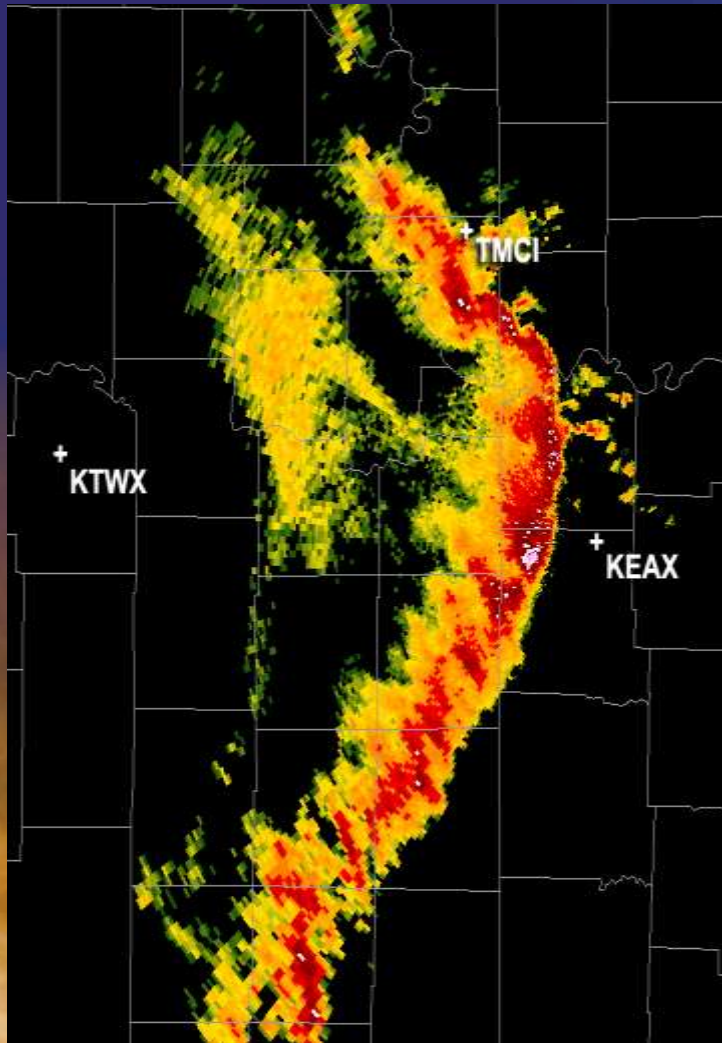


02 May 2008 06 UTC – RUC2 850 hPa



080502/0600V001 850mb hght/temp/dwpt/wind

Radar Locations/Data Availability



KEAX: WSR-88D

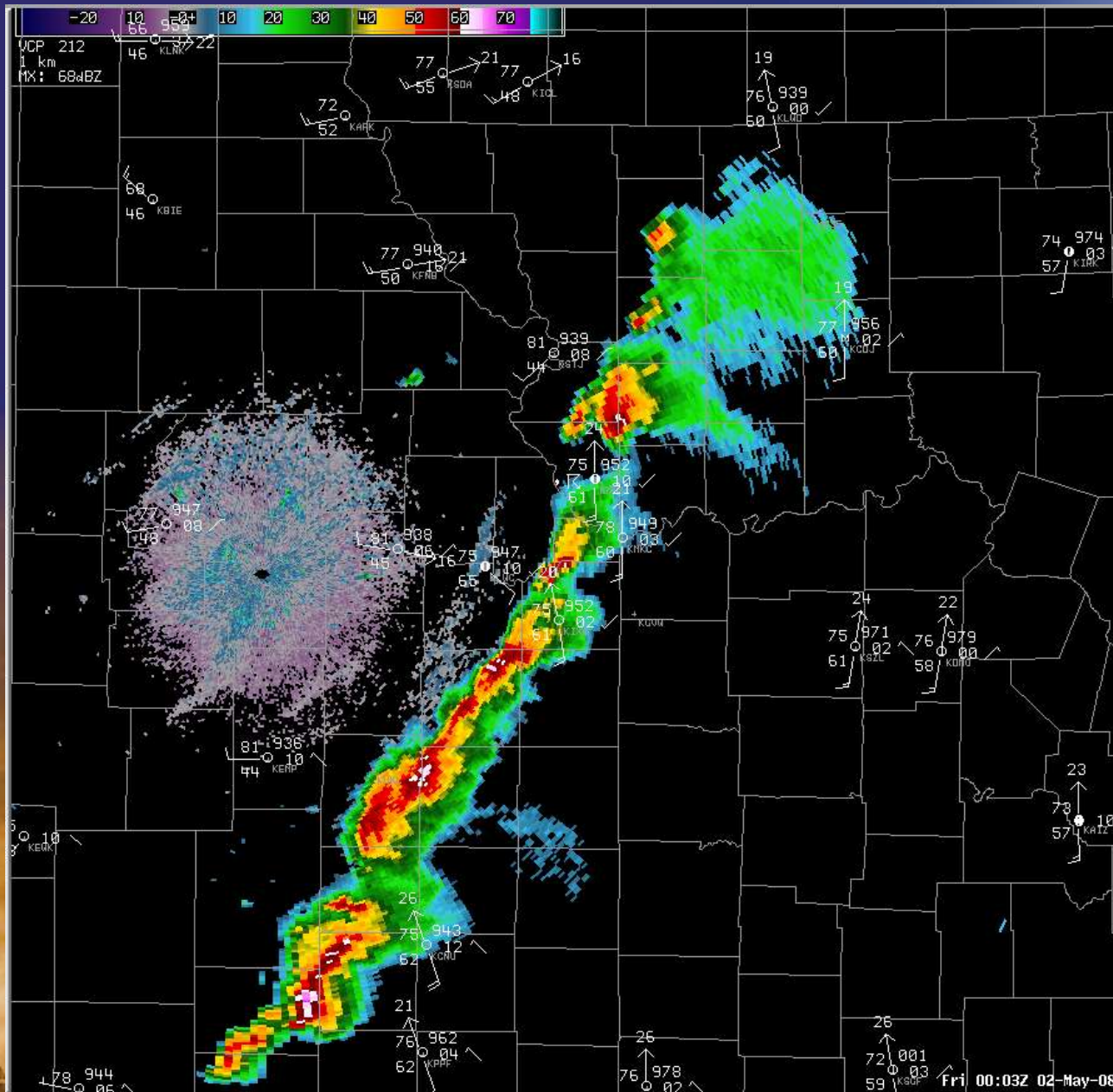
- Pleasant Hill, MO (26 SE KC MO)
- VCP 211 – SZ-2 De-aliasing, ~5 min updates
- Z: 1° x 1km resolution
- V/W: 1° x .25 km resolution

KTWX: WSR-88D

- Alma, KS (30W Topeka)
- VCP 212 - SZ-2 De-aliasing, ~4.5 min updates
- Z: 1° x 1km resolution
- V/W: 1° x .25 km resolution

TMCI: Terminal Doppler

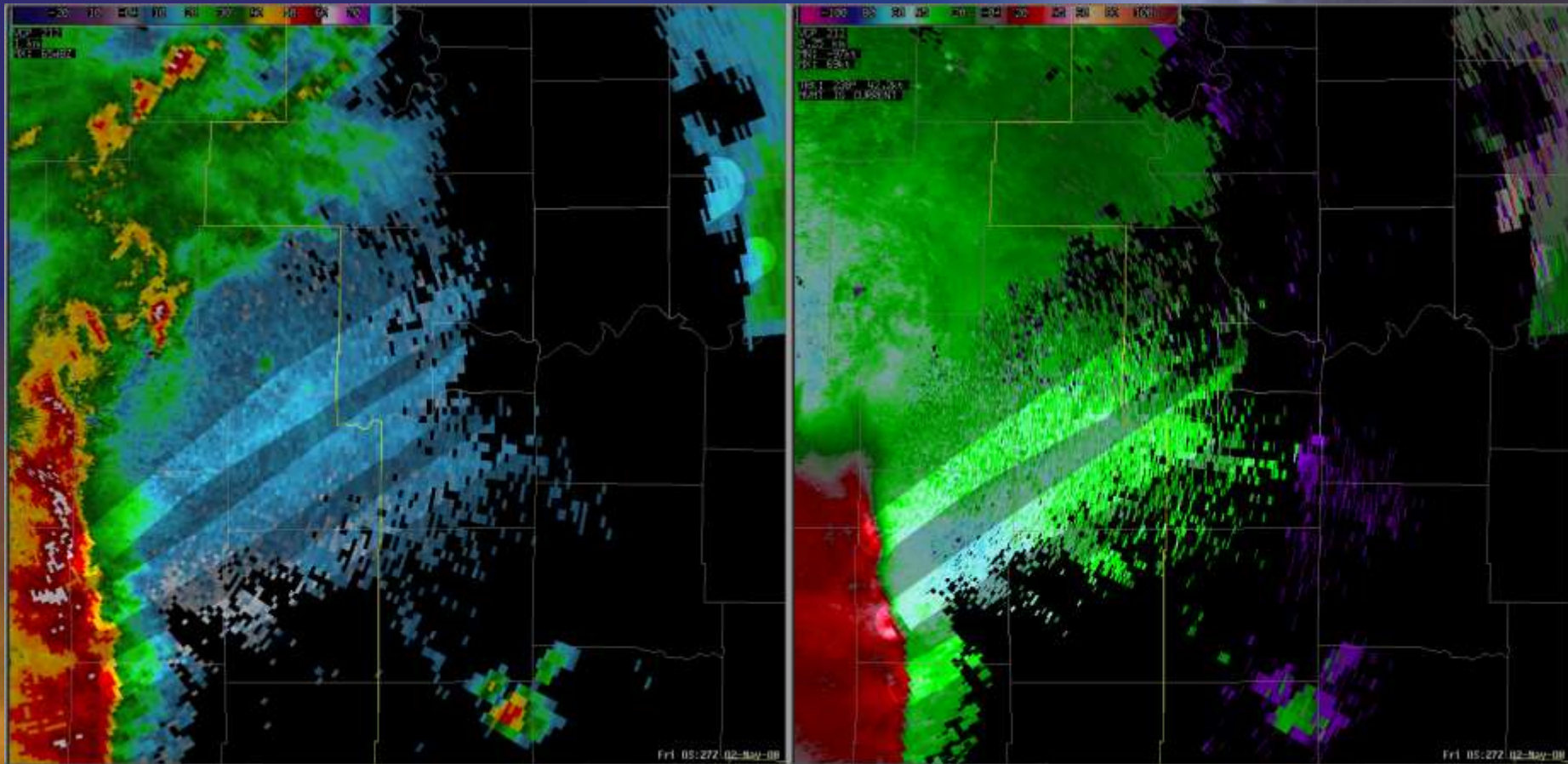
- Dearborn, MO (29 NW KC MO)
- VCP 80 – ~1 minute updates
- Z: 1° x 300m resolution
- V: 1° x 150m resolution
- W: Not Available for this case
- Lowest Elevation 0.0°/0.3°



Observations:

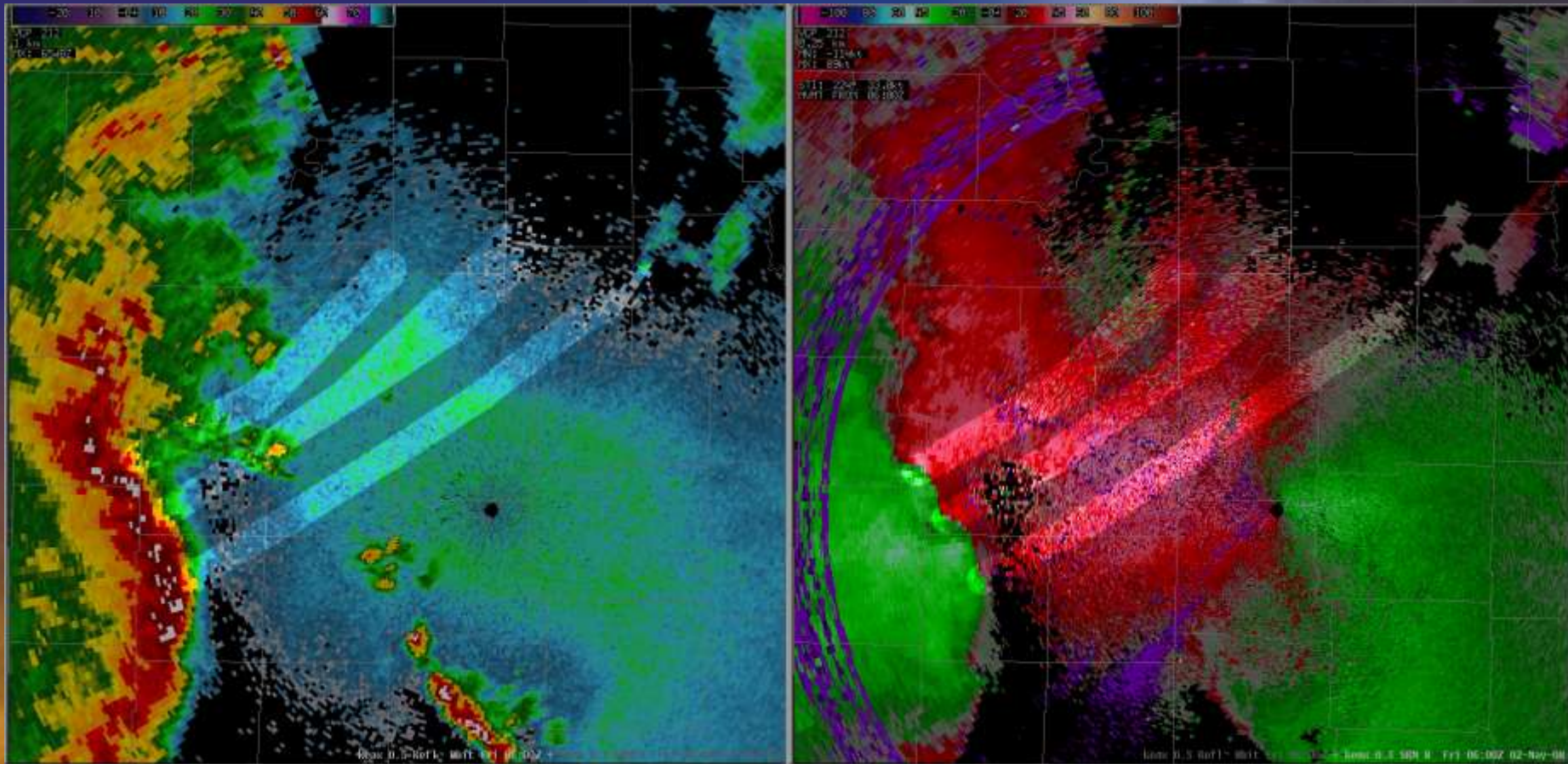
- QLCS initiation via cold front / retreating dryline interaction
- Initial supercell dissipation
- Modified heat burst

KTWX 0.5° Z/SRM Loop



Analyzed meso-vortex tracks unmasked

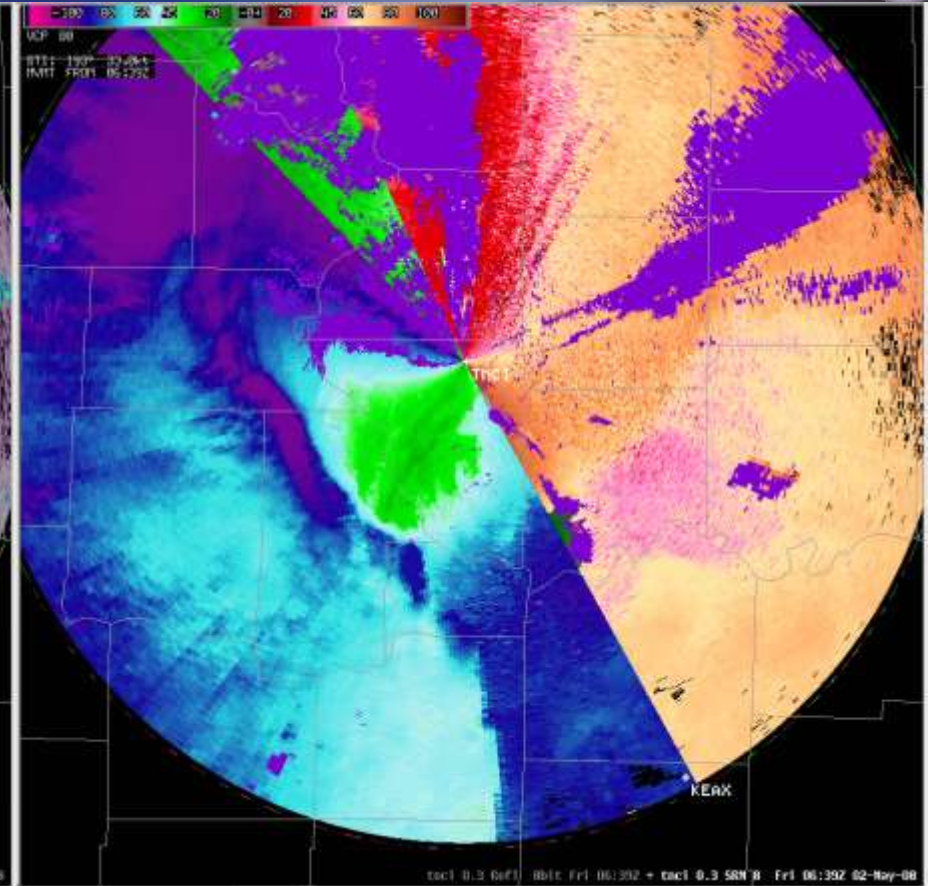
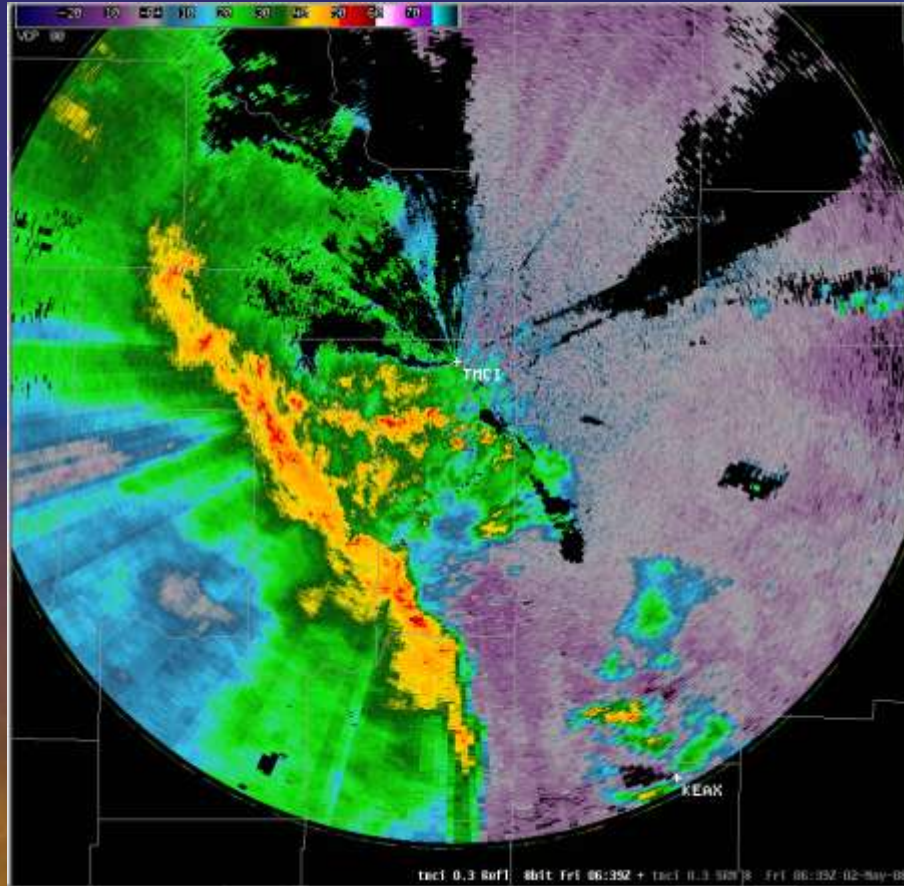
KEAX 0.5° Z/SRM Loop



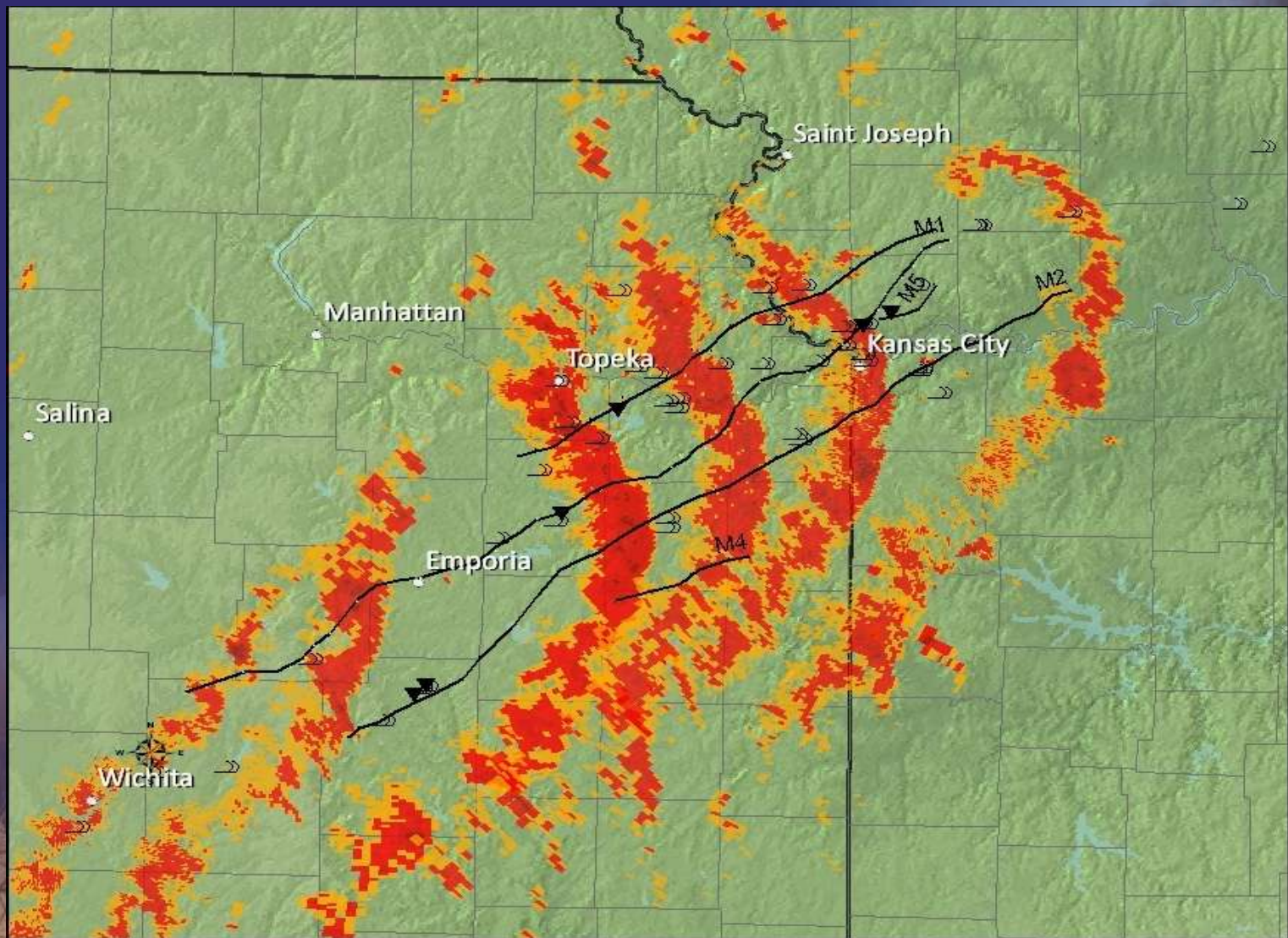
Analyzed meso-vortex tracks unmasked



TMCI 0.3° Z/SRM Loop



- 5 cm wavelength leads to problems with attenuation
- Major de-aliasing problems made real-time use of velocity data nearly impossible



**40 dBZ and greater echoes shown at 1-hr intervals
Analyzed meso-vortex tracks, known downburst and
tornado damage are depicted.**

Operational Considerations



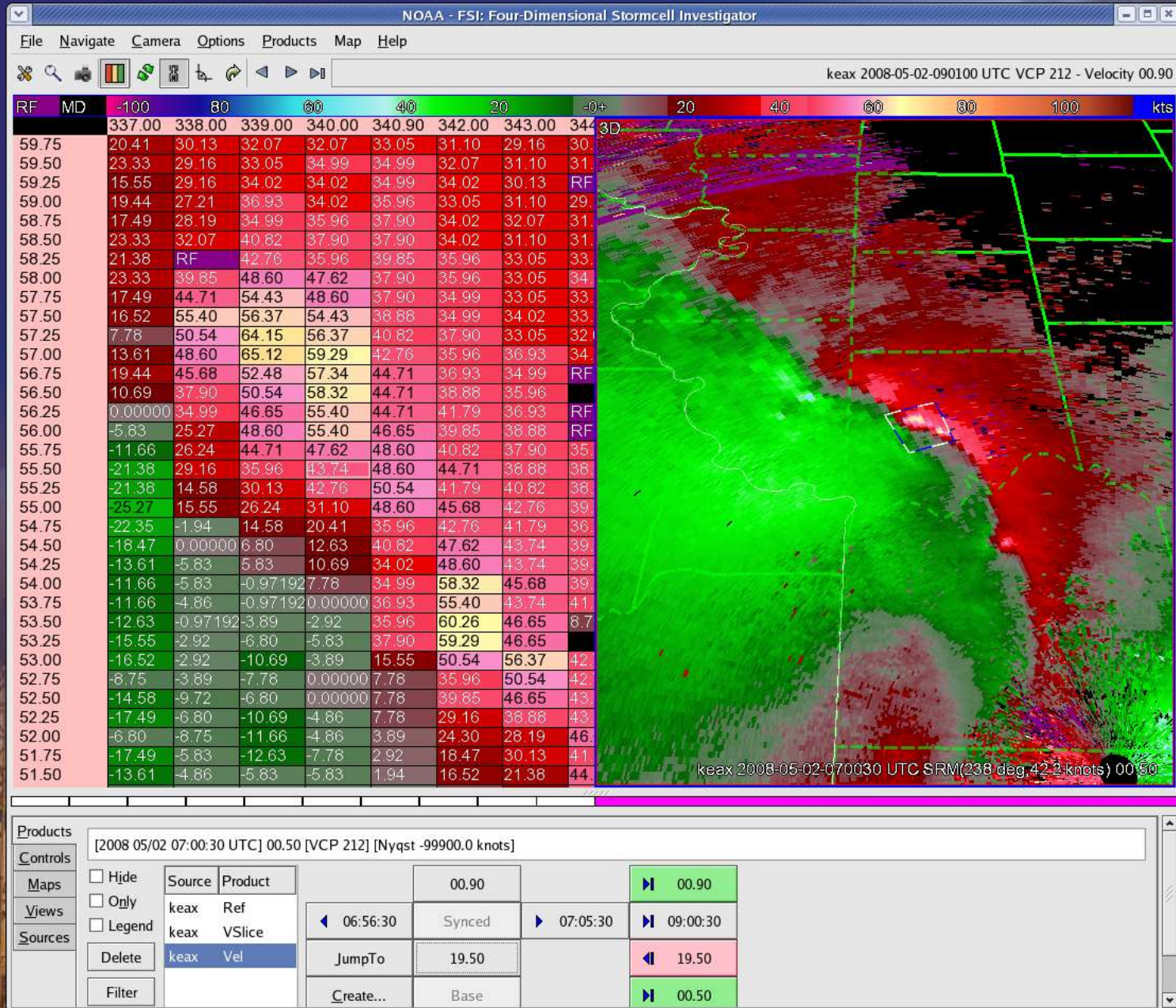
- **Sectorization** allows one warning forecaster to zoom in and focus on small-scale features responsible for most of the wind/tornado damage
- Use **fast, rocking loops** to observe preceding boundary movement and interaction with QLCS.
- Use **highly contrasting color curves** to help identify small scale meso-vortices
- **SRM preferred** to base velocity to subtract out typical rapid QCLS motion and observe meso-vortex evolution.
- Depth of all vortex circulations were < 5 kft AGL. **Use VCP 212** to gain additional lower tilts for better analysis.
- **SuperRes data is key!!** 8x improvement in reflectivity resolution (2x azimuth, 4x range) and 2x improvement (azimuth) in velocity/spectrum width
- Use of **4-D Storm Investigator (FSI)** for real-time cross sections and bin readout.

Future Work

- **Correct TMCI de-aliasing problems so that a dual/tri-Doppler analysis may be attempted in order to calculate horizontal vorticity, vertical velocity, etc...**
- **Perform more in-depth analysis of Vr traces to distinguish between tornadic and non-tornadic meso-vortices.**



AWIPS FSI Bin Readout



AWIPS 4-D Storm Investigator (FSI)

